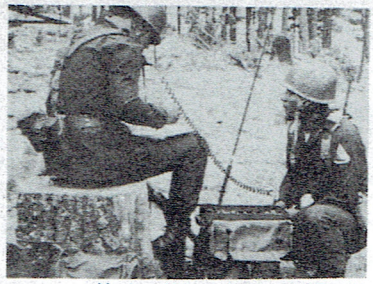

Mexican Military: Revista del Ejercito y Fuerza Aerea Mexicanos

DXing VHF Low Band Skip

How to Hear Distant Stations Between 30 and 50 MHz

By Brian Webb

Imagine listening to a police man-hunt on the other side of the country, a cordless telephone conversation from Central America, or a real estate company in Argentina. Far fetched? Not at all. Of the entire radio spectrum, few parts are more interesting than the VHF low band. Lying between 30 and 50 MHz, this region can combine the local communications heard on the higher bands with the long range reception of shortwave. DXing this band is easier than you think. All you need to get started is some basic information.

Propagation

An important ingredient for successful VHF skip DXing is an understanding of radio wave propagation. Between 30 and 50 MHz, radio signals are propagated long distances by two different means: F_2 and Sporadic-E.

F_2

The primary medium for long distance low band reception is the F_2 layer of the ionosphere. This layer is created by solar radiation and is found on the daylight side of the earth between altitudes of 200 and 250 miles (322 and 402 km). The highest frequency that the F_2 layer is capable of propagating is called the maximum usable frequency (MUF). The F_2 layer's MUF is influenced by the **time of day**, **solar activity**, and the **season**.

The F_2 region's ionization and the MUF are at their minimum before sunrise. As the morning progresses, the F_2 layer's ion density and the MUF increase, reaching their maximum value around noon. During the afternoon, the F_2 layer's ionization and the MUF decrease.

The daily peak F_2 MUF is heavily influenced by solar activity. When the 11-year solar cycle is at its minimum, the daily peak MUF is approximately 17 MHz. As solar activity increases, the daily peak MUF rises. Eventually, about two years before the peak of the cycle, the daily peak MUF will reach 30 MHz, making long distance VHF reception possible. During the peak of the cycle, the daily peak MUF can reach 70 MHz.

As the solar activity declines, so does the daily peak MUF. About two or three years after the peak of the cycle, the daily peak MUF will drop below 30 MHz, making the VHF low band unusable for long distance DX reception. The solar activity and F_2 MUF decline until the minimum is reached and the next 11-year cycle begins.

VHF F_2 reception also varies according to the season. During the late spring and early summer, F_2 propagation above 30 MHz is scarce and much of the time the band appears to be dead. Conditions are better in the mid-spring and mid-summer when a small number of stations can be heard. Virtually all of these stations are from a zone between 30° north to 30° south of the equator. North American DXers will hear stations from Florida, the Gulf Coast, southern Texas, Mexico, Central America, the Caribbean, and the northern half of South America.

Around the time of the spring and autumn equinoxes, reception from a zone extending from 45° north to 45° south latitude becomes possible. Listeners in North America will hear a mix of U.S. and Latin stations (the equinoxes produce the best conditions for hearing Latin America). At the same time, very long transequatorial signal paths can occur, allowing reception of stations halfway around the world. North American DXers should be alert for morning openings to southern Africa and afternoon openings to Australia and the South Pacific.

From mid-autumn to mid-winter, the reception footprint moves into the winter hemisphere, and the F_2 MUF is the highest. Although transequatorial propagation is still possible, most of the stations heard are from a zone extending from the equator to the sub-arctic.

The minimum distance from which a VHF signal can be heard via F_2 varies with the frequency. This is a result of the propagation geometry (Figure 1). Local VHF stations are usually heard out to a range of 50 miles (80 km). Fringe stations are sometimes audible out as far as 150 miles (241 km). Extending from 150 miles (241 km) to beyond 1,000 miles (1,609 km) is a dead zone from which F_2 reception is not possible. Signals from this zone penetrate the F_2 layer at angles too steep to be refracted earthward. As the distance from the receive site is increased, the inside edge of the DX zone is reached. This represents the minimum distance that a signal can be heard via F_2.

At 30 MHz, signals can be heard via F_2 no closer than about 1,200 miles (1,931 km). As the frequency is increased, the inside edge of the receive zone moves farther outward. At 47 MHz, this distance increases to 2,100 miles (3,379 km). Let me clarify this concept with a real world example: From my location in southern California, I can hear stations on 30 MHz from the entire eastern half of the U.S. Up at 47 MHz, however, I can only hear stations from the east coast and Appalachia (PA, SC, NC, FL, CT, DE).

Yet another factor that influences VHF F_2 reception is the DXer's latitude. The length of the F_2 season, daily peak MUF, and consistency of reception all decrease the further the listener is located from the equator. This can be illustrated by comparing my observations of the 1991-1992 VHF F_2 season with those of Max Van Arnhem. My receive site is located at 34° north. During the last F_2 season, I received skip for a 10 month period (from late September to late April). The observed daily peak MUF was almost always above 39 MHz and on several days it was above 47 MHz. F_2 reception was consistent; skip was heard almost every day between September and March.

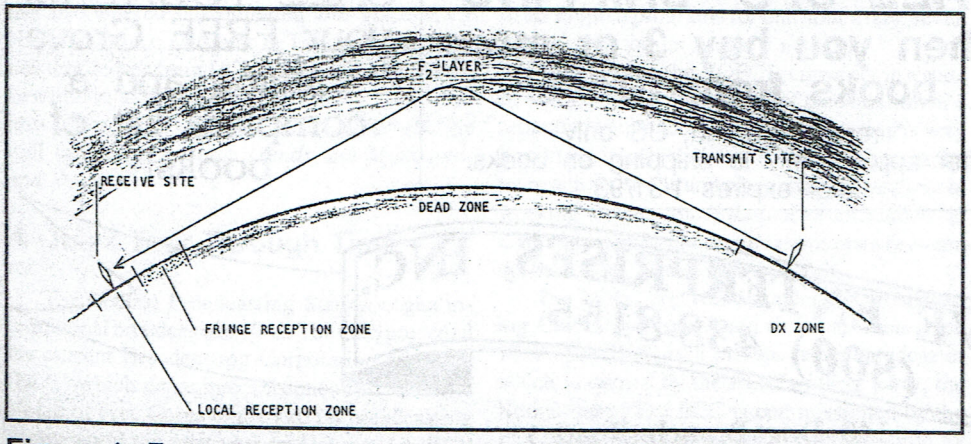

Figure 1: F_2 propagation geometry and reception zones.

Van Arnhem, who is situated at 52° north, noted different conditions. His F_2 season was only 7 months long (from late September to late April), his observed MUF was usually 5 MHz lower than mine, and his reception was much more erratic. In a letter he wrote: "This season, daily variations in the MUF are very great ... there are days without F_2 skip ... while sometimes the MUF is as high as 44 MHz."

Another interesting phenomenon is that F_2 skip is better heard from certain directions compared to others. Over the equator and the tropics, the F_2 layer exhibits the least seasonal variations, is the most immune to solar flares and geophysical disturbances, and exhibits the highest MUF. As you move away from the equator, the F_2 is more influenced by seasonal, solar, and geophysical effects. In addition, the MUF decreases. Thus, for DXers in the temperate latitudes, signals are best heard from the direction of the equator and worst from the direction of the pole (the north pole for listeners in the northern hemisphere and the south pole for DXers in the southern hemisphere).

For North American listeners, signals will be heard best from the south. Immediately before and after the annual mid-year F_2 blackout and during periods of disturbed propagation, virtually all of the stations received will be from Caribbean and Latin America. When F_2 propagation is good, the highest MUF, longest signal paths, and best signal strengths will be towards the southeast, south, and southwest. Conversely, reception of stations from the sub-arctic and arctic is uncommon and transpolar VHF propagation is rare.

Listen Up: There's Little Time Left

Now that we've gone over the dynamics of F_2 propagation, information on when to listen is in order. As mentioned earlier, solar activity needs to be high for VHF F_2 reception to occur. Unfortunately, the current solar cycle reached its peak a few years ago and solar activity is on the decline. This means that DXers in the temperate latitudes have only two more VHF F_2 seasons remaining. The approximate starting and ending dates of these seasons are listed in Table 1.

Table 1: VHF F_2 Season Beginning and Ending Dates

1992 - 1993

DXer's Latitude (°N)	Begins	Ends
35	September 7	April 7
45	September 21	March 21
55	October 21	February 21

1993 - 1994

DXer's Latitude (°N)	Begins	Ends
35	October 21	February 21
45	November 21	January 21
55	---	---

Since VHF F_2 reception is a daytime phenomenon, do all of your F_2 DXing during the day. Some F_2 skip should be present, especially at the lower end of the band (between 30 and 34 MHz). Experiment and listen at different times of the day. Besides hearing new stations, you'll also get familiar with how VHF F_2 skip works. Certain areas are heard best at specific times. The optimum time to hear various areas is summarized in Table 2.

Table 2: Optimum Times for Various DX Target Areas

Target Area	Optimum Time
>5,000 miles (8,045 km) east	Sunrise to mid-morning
1,800 to 2,600 miles (2,896 to 4,183 km) east	Mid-morning to noon
Directly north or south	Late morning to early afternoon
1,800 to 2,600 miles (2,896 to 4,183 km) west	Noon to mid-afternoon
>5,000 miles (8,045 km) west	Mid-afternoon to sunset

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Sporadic-E

VHF low band signals are also heard over long distances via Sporadic-E propagation (also written as E_s). E_s is the result of patches of ionization that form just below the E-layer of the ionosphere. These clouds of ions are dense and occur at altitudes between 50 and 60 miles (80 and 97 km). With diameters between 50 and 100 miles, these ionized patches tend to move towards the west or northwest at speeds between 150 and 250 miles (241 and 402 km) per hour.

The ion density of Sporadic-E clouds is often very high. This leads to observed MUFs well above 50 MHz. E_s propagation is occasionally present in the 2-meter amateur band and has even been noted as high as 223-225 MHz band. Another consequence of this very high ion density is low signal path loss and very strong signals. It's not unusual to hear a station more than 1,000 miles (1,609 km) away exhibit a stronger signal than your local stations.

Unlike F_2 propagation, which allows DX to be heard from a vast area, E-skip reception is much more limited. Although multi-hop Sporadic-E propagation does occur, most E-skip is the result of a single bounce. This, combined with the fact that E_s ionization occurs at relatively low altitudes, limits the maximum range of most E-skip to about 1,300 miles (2,091 km). The minimum distance that signals can be heard via Sporadic-E is about 225 miles (362 km) at 30 MHz and 375 miles at 50 MHz.

The small diameter of E_s clouds further limits the area from which DX can be heard. Sometimes Sporadic-E skip is only heard from an area as small as the state of Kansas. From my listening post in southern California, I usually only hear one or two areas at a time such as northern Texas, Kansas, or the Washington-Oregon-Idaho region.

As mentioned earlier, Sporadic-E clouds tend to drift at high speed towards the west and northwest. This movement has two interesting effects on low band reception. First, the strength of a received signal can go from weak to very strong and back to weak in the course of an hour. In addition, the area being heard often changes. A DXer in California might hear low band stations from Texas in the morning, Colorado in the early afternoon, and Oregon in the evening.

The times at which E-skip appears and the lengths of the openings vary with the DXer's latitude. In the equatorial region, Sporadic-E can appear at any point of the 11-year cycle, in any season, and at any time of day or night. The openings last from several hours to an entire day.

At temperate latitudes, Sporadic-E openings occur each year, regardless of the solar activity. About 80% of the E_s openings occur in the late spring and early summer with peak activity during the four week period centered on the summer solstice. During the mid-year Sporadic-E season, skip can materialize at any time of day, but it's most common in the late morning and early evening. A minor E-skip season also occurs around the winter solstice with most (but not all) openings in the evening. In the temperate regions E-skip openings last from several minutes to an hour.

At the high latitudes and in the polar regions, Sporadic-E is limited to the years of moderate and high solar activity. The openings occur during the night time hours of the spring and autumn and last from several minutes to an hour.

Important indications of Sporadic-E to watch for are changes in television reception on the channels between 54 and 88 MHz (channels 2, 3, 4, 5 and 6 in the Americas). Look for video on normally empty channels, images superimposed on your local station's picture, or your local station's video appearing to pulsate. If you see any of these signs, go to your scanner and check the 30-50 MHz band for E-skip.

Table 3: U.S. Non-government Frequency Allocations

30.580 - 31.980
33.020 - 33.980
35.020 - 35-980
37.020 - 37.980
39.020 - 39.980
42.020 - 46.580
47.020 - 49.580

Table 4: U.S. Military and Government Frequency Allocations

30.000 - 30.550
32.000 - 33.000
34.000 - 35.000
36.000 - 37.000
38.000 - 39.000
40.000 - 42.000

Equipment

Contrary to popular belief, you don't need a receiver like an R-7000 and a log periodic antenna to hear VHF low band skip. Even a modest receiving setup should pull in a large amount of DX. There's a good chance that you already have all of the equipment you'll need.

Receiver: Any scanner that can receive the 30-50 MHz band will do. Although not critical, a large channel capacity is helpful, especially for ferreting out E-skip.

Antenna: Good VHF skip reception is possible with a relatively simple antenna. If you already have a scanner or shortwave antenna, it might work. You can test your existing antenna by listening between 30 and 40 MHz. If you can hear stations more than 20 miles (32 km) away, your existing antenna will probably suffice.

If your existing antenna isn't up to the task, you can make a simple indoor VHF low band monopole. This type of antenna is easy to make and should work well as long as the surrounding walls are transparent to RF. Cut a piece of hookup wire to a length of 7 feet 3.75 inches (2.22 m) and solder the end to an RF connector. Plug the connector into your radio's antenna jack and then orient the monopole so that it's more or less vertical. Then use a nail or push pin to affix the end to the wall.

Cassette Recorder: This is an essential piece of equipment for catching CW station IDs, station callsigns, place names, and other information needed to identify a station. A cassette recorder also allows you to save your best DX catches for posterity. Your recorder should have jacks for mic, remote, and earphone as well as a tape counter.

The recorder should be connected directly to the receiver via a patch cord. An earphone or speaker should be plugged into the earphone jack to allow monitoring while the unit is recording.

Timer: A useful accessory is an electronic timer. You can use a timer to activate your cassette recorder when you're away from home and record skip for later playback.

Frequencies

The topic of which frequencies to monitor is too broad to be discussed in detail here. For the newcomer I would suggest beginning by hunting for U.S. skip. My advice is based on the fact that the U.S. probably has more 30-50 MHz stations than any other country, they're widely heard (at least as far as Europe via F_2), and they often identify themselves. U.S. VHF low band activity is concentrated into the sub-bands listed in Table 3 (frequencies in MHz).

The sub-bands listed in Table 3 are used by business, police, fire/paramedics, local government, etc. All of the channels are spaced in 20 kHz steps (i.e. 35.020, 35.040, 35.060 MHz, etc).

U.S. Military and other government communications can also be heard. These stations are mostly found in the sub-bands listed in Table 4 (frequencies in MHz):

The U.S. military tends to use channels that are spaced in 50 kHz steps (i.e., 34.000, 34.050, 34.100, 34.150 MHz, etc.). These sub-bands also contain stations operated by other government agencies such as the U.S. Fish and Wildlife Service (34.830 MHz). Since the above segments of the 30-50 MHz band contain relatively few U.S. stations, they're free from interference and serve as windows for foreign DX. Because foreign stations can appear on just about any frequency, scan these sub-bands in 5 kHz increments.

You can increase the amount of skip that you hear by intelligently selecting the frequencies that you monitor. Choose frequencies that will be below the expected MUF. Since the F_2 MUF varies with the 11-year solar cycle and solar activity is declining, select frequencies between 30-43 MHz during the current (1992-1993) F2 DX season and 30-36 MHz during the 1993-1994

season. When searching for Sporadic-E, which often propagates signals above 50 MHz, you may choose frequencies from throughout the 30-50 MHz band. It's also important to select frequencies that are free of local stations. This prevents your radio from locking onto locals while scanning and keeps you from wasting your time trying to identify a local.

When choosing frequencies, give preference to those that have a high volume of radio traffic. These would be U.S. business, special industrial, fire, police, and special emergency (ambulance) frequencies. Be sure to avoid frequencies that are allocated only for mobile or low power use. These frequencies tend to be quiet and rarely have any signals strong enough to be heard clearly. Information on U.S. frequency allocations can be found in the back of any *Police Call* frequency directory in a section titled "Consolidated Frequency Tables."

The more frequencies you search, the greater your odds of finding skip. If your scanner has the channel capacity, (or if you have a second radio), you can also program in the frequencies used in the U.S. for forest products, petroleum production, telephone maintenance, power and utilities, motor carrier (trucks and buses), highway maintenance, local government, forestry conservation, and paging. If you still have channels left that you want to fill, program in U.S. military frequencies.

Monitoring Techniques

Single Frequency Monitoring: This method involves continuously monitoring a frequency for at least 30 minutes and listening for voice and CW station IDs. You can either monitor the frequency in person or record the received signals while you're away from home for later playback.

Search Between Limits: This technique uses a scanner's ability to search between two frequencies. It's a simple way to locate skip and determine the MUF. When using this method program your radio to search in 5 kHz steps.

Limited Channel Search: This method calls for programming your radio to scan all of the clear channels in a limited portion of the 30-50 MHz band or to only scan the channels used for a specific purpose. For example, you could scan the channels of the 33.420 - 33.980 MHz fire/paramedic sub-band or the low band channels used exclusively by the U.S. Coast Guard.

Extensive Channel Search: This approach is a rapid scan of 200 or more clear channels between 30-50 MHz. When used for F_2 DXing, it enables you to easily find skip and determine the MUF. It's also the best way to hunt for Sporadic-E openings. During E-skip season you can use your radio as an Es alarm by letting it operate in this way for extended periods.

These advantages, however, come at a cost. You'll need a radio with at least 200 channels and be willing to dedicate them to low band DXing. It will also be necessary to carefully select the frequencies to be scanned and then load them one by one into your scanner. Once you begin scanning, you'll find that several of the channels that you believed to be clear are used by local stations. As each of these occupied channels is found, you'll have to replace it with another clear frequency.

Useful Tips

• As mentioned earlier, many U.S. low band stations identify themselves. The majority of the IDs are a verbal recital of the station's callsign by the base station. Stations operated by businesses sometimes ID when they are calling a mobile unit or at the end of a conversation. Since these IDs are unpredictable, be sure to have your cassette unit recording when you're listening to business and industrial stations.

Many police, fire/paramedic, and ambulance base stations identify themselves at the start of each hour (a few also ID on the half hour). At about 50 minutes past the hour, check police, fire, and ambulance frequencies for activity. If you find an active frequency, go back to it at 58 minutes past the hour, start your cassette recorder, and sit on the frequency for four minutes, to try to catch the ID.

Some stations identify themselves with an automatic Morse Code ID. Most of the time you'll stumble onto one of these IDs as you scan the band. If you don't hear the entire ID, or if it's too fast for you to copy, note the frequency and the time you heard it. Go back to the frequency an hour later with your tape recorder on; if you're lucky, you'll hear the ID again.

• Accurate record keeping is a simple way to enhance VHF low band DXing. Taking detailed notes of what you hear can help you produce higher quality loggings, identify what you hear, and DX more efficiently. When you intercept interesting radio traffic, write down the basic facts and anything that might assist you in identifying the station, such as the following:

- Frequency
- Date (UTC)
- Time (UTC)
- Mode (Narrow Band FM, AM, etc.)
- Type of signal (voice, voice and music, modulated CW)
- Type of propagation (F_2 or E_s)
- Language (English, Spanish, French, etc.)
- Accent (U.S. Southern, New York City-New Jersey, Mexican, etc.)
- Place names mentioned (Cherokee County, I-95, Avenida Juan Peron, etc.)
- Callsigns heard
- References to the local time
- Subject matter discussed

Maintaining lists is also helpful. Since I'm only interested in hearing skip, I try to avoid frequencies that are used by local stations. This is easy, because I keep a list of all locally used frequencies. I also maintain a list of clear frequencies which have distant stations that I haven't had a chance to log. It contains frequencies used by distant U.S. business and military stations and the frequencies on which Morse Code IDs have been noted.

Time to Get Started

F_2 skip is still feasible until February or April, depending upon your latitutde, so let's not waste any time recording and logging potential skip transmissions. In a second installment, we'll discuss how to identify those unknown loggings, how to build an outdoor VHF sloping dipole if your current antenna has not proven adequate, and we'll publish a selected list of logged and identified skip communications for your inspiration!

Meanwhile, I'd be interested in what you hear. Comments and questions are welcome at the following address: Brian Webb, P.O. Box 6484, Thousand Oaks, CA 91359-6484.

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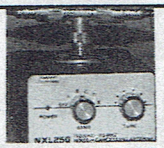
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VHF Low Band Skip (Part II)

Identifying DX

By Brian Webb

Last month we covered what causes VHF skip and when and where to look for it. But the most difficult facet of VHF skip DXing isn't hearing skip, it's identifying what you've heard. The two best sources for identifying U.S. nongovernment stations are the *Police Call* frequency directories and FCC records. Gene Hughes' *Police Call* directories list police, fire/paramedic, local government, state government, and some federal government stations.

These books, however, don't list the vast number of U.S. business stations. In spite of that, they're a good source of information and they're affordable (the entire nine volume set can be bought for about $100.00).

The best source of information on nongovernment U.S. stations is the FCC Master Frequency File. It lists stations in frequency order by state and city. Unfortunately, this microfiche list costs over $700, putting it out of reach for most radio hobbyists. And while companies such as Grove Enterprises sell the computer database in affordable regional chunks, you really need access to the entire database for skip identification. (Again, at a cost of hundreds of dollars.)

You don't need to own the entire database to obtain this information, however. You can examine the list by visiting your local FCC field office. If that's not possible, you can call your local field office by telephone and ask them to look up a few stations (be sure not to do this too often!).

Another option is to pay the Downtown Copy Center (a government contractor) to research the information for you. They charge $15 per hour and require detailed instructions on what you want them to do. Their address and telephone number are as follows:

Downtown Copy Center
Attn: Virginia Cannon
1990 M Street, N.W., Suite 640
Washington, DC 20036
Telephone: 1-800-541-1194

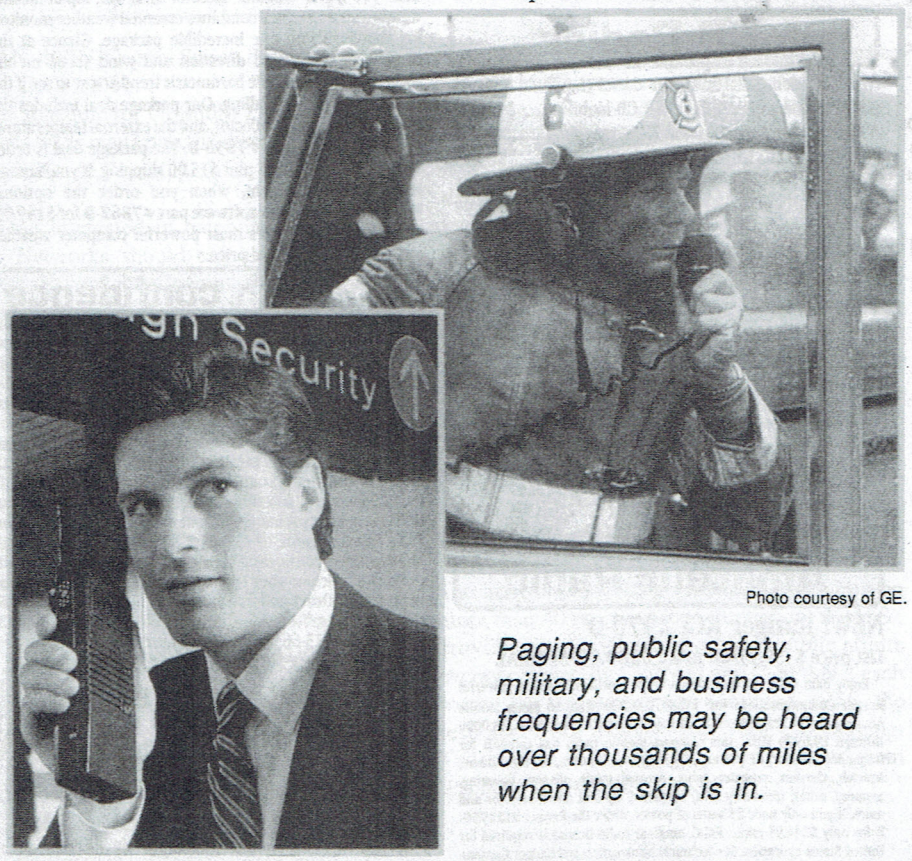

Photo courtesy of GE.

Paging, public safety, military, and business frequencies may be heard over thousands of miles when the skip is in.

Unfortunately, identifying stations from countries other than the U.S. is much more difficult. Since most of the non-U.S. skip heard in North America isn't in English, the language needs to be identified and the communications translated. An additional problem is that non-U.S. stations usually don't identify themselves. This is because foreign governments aren't as strict as the FCC regarding station IDs and many foreign stations aren't even licensed (especially true in Latin America). Even if a station is licensed, the licensing authority is usually unwilling to answer questions from DXers.

According to international agreement, whenever a government issues a license, the International Telecommunications Union in Berne, Switzerland, is supposed to be informed. This often doesn't happen, but when it does, the license data is entered into a database called the International Frequency List.

It would seem that the IFL would be a great tool for identifying DX, but that isn't the case. Not only is the IFL incomplete, it's very expensive, costing over $1,400 (U.S.) for the microfiche version and over $700 (U.S.) for a CD ROM. To make things worse, very few copies of the IFL exist in the U.S. However, the Downtown Copy Center in Washington, DC, can retrieve the IFL from the FCC library and research information for a fee. Contact them at the above address if you're interested.

In spite of these obstacles, it is possible to identify non-US skip. The most important clues are the language spoken, accent heard, and references to place names.

The first thing to do is identify the language and then locate someone to translate a recording of your catch. High schools and colleges are good sources for translators. Not only can you find foreign language instructors, you can often find native speakers of the language among members of the student body. Also, check the local businesses in your town and look for businesses owned by Latin American and other immigrants.

Once you've identified a prospective translator, approach him/her and ask for assistance. Play a recording of the intercept to your translator and ask him/her to attempt to identify the nation-

(turn to p. 25)

Table 5: Selected Frequencies For F_2 DXing

Freq. (MHz)	Mode	Signal Type	Language	Callsign(s)	Location	Comments
30.000	NBFM	Voice	ss		Central Mexico	Army stations
30-060	NBFM	Voice	ss		Cordoba Prov., Argentina	Ranches
30.150	NBFM	Voice	EE		U.S.	Military
30.280	AM	Voice	EE	BBC	Antigua	Harmonic of 15.140 MHz
30.300	NBFM	Voice	EE	Control 2	Air Ground Combat Center, CA	Marines
30.350	NBFM	Voice	EE	Crestline, Long Rifle Red Beach, Short Pistol	Camp Pendleton, CA	Marines
30.450	NBFM	Voice	EE	Clear Creek, Jack Mount, Range Control	Fort Hood, TX	Army
30.460	AM	Voice	ss	Radio Habana Cuba	Habana, Cuba	Harmonic of 15.230 MHz
30.475	NBFM	Voice	ss	25,29,35	San Salvador, El Salvador	Taxi company? Mobile units have two digit IDs.
30.500	NBFM	Voice	EE		U.S.	Military
30.545	NBFM	Voice	ss		Central Mexico	Cordless phone or radio telephone
30.660	NBFM	Voice	EE		San Francisco, CA	Municipal bus system
30.690	AM	Voice	ss	Radio Nacional	Buenos Aires, Argentina	Harmonic of 15-345 MHz
30.760	NBFM	Voice	EE		U.S.	Very active business frequency
30.820	AM	Voice	GG	Deutsche Welle	Antigua	Harmonic of 15.410 MHz
30.900	NBFM	CW	--	KGB732	Allegheny County, PA	Port Authority of Allegheny Co. IDs in CW
30.940	NBFM	Voice	EE	BI Control, KDZ411/ KNGW228/Miami, KJ1564/Homestead, KJT686/Clewiston, 102,157,330,433,501,609	Southern FL	South Florida Water Mgmt. District. Base stations ID with FCC callsign and location. Mobile units three digit IDs.
31.020	NBFM	CW	--	WNIM250	Broomall, PA	Southeastern Pennsylvania Transportation Authority. IDs in CW.
31.060	NBFM	Voice	EE	New Orleans, 510, 515	LA	Louisiana Department of Wildlife and Fisheries. Base stations ID with location. Mobile units have three digit IDs.
31.160	NBFM	Voice	EE		Los Angeles, CA	Super Car Charter Carrier (taxi company). Listen for San Fernando Valley addresses.
31.280	NBFM	CW	--	WRS549	Central SC	IDs in CW
31-350	NBFM	Voice	ss	Radio Aviso	Montevideo, Uruguay	Paging station. Voice ID at start of hour.
31.420	NBFM	CW	--	XKC23, XKC66, XKC239	Montreal, Canada	Stations ID in CW.
31.460	NBFM	Voice	EE	KIG954	Elizabeth City, NC	North Carolina Division of Forest Resources. Daily weather report at 13:00 ± 30 min.
31.480	NBFM	Voice	EE		Western Hemisphere	Busy U.S. industrial frequency. Stations heard include Harvey Base, Harvey, Louisiana; oil tankers throughout western hemisphere (ID as Gulf Fleet XX); and workboats and oil platforms in Gulf of Mexico.
31.800	NBFM	CW			CT	Della Construction Co. IDs in CW.
32.100	NBFM	Voice	EE		U.S	Military
32.250	NBFM	Voice	EE	Channel 1	Camp Pendleton, CA	Marines
32.500	NBFM	Voice	EE		U.S.	Military
32.700	NBFM	Voice	EE	Range Control	Fort Irwin, CA	Army
32.750	NBFM	Voice	EE	Channel 2	Camp Pendleton, CA	Marines
32.820	NBFM	Voice	ss		Concepcion, Argentina	Paging station
33.060	NBFM	Voice	EE	KME594, KNAB678, KNAB762, WNAY204	Los Angeles, CA	Los Angeles city street maintenance
33.180	NBFM	Voice	EE		LA and Gulf of Mexico	Traffic related to oil production. Stations heard include Leeville Base (ChevronOil), Leeville, Louisiana and workboatsand oil platforms in Gulf of Mexico.
33.300	NBFM	Voice	EE	KAR933	Bloomington, TX	Natural Gas Pipeline Co. of America
33.375	NBFM	Voice	ss	Control, QM306, QM308, 304, 305,317, 319, 333, 337,339, 347	Cuba	Farm net
33.380	NBFM	Voice	ss	Mantenimento Coordinacion	Vespucio, Argentina	Base station. Traffic with maintenance personnel in field.
33.440	NBFM	Voice	EE	Cherokee, Station 15, 15-3, 1502, 1503	Cherokee County, GA	Cherokee County FD
33 .640	NBFM	Voice	EE	KDC288	Hollis, NH	Hollis FD. Voice ID at 00 and 30 min. past hour.
33.700	NBFM	Voice	EE	OCD	Los Angeles, CA	Los Angeles City FD
33.740	NBFM	Voice	EE	WNAL734	Rockingham County, VA	FD. Voice ID at 00 and 30 min. past hour.
33.500	NBFM	Voice	ss		Mexico	Military
33.860	NBFM	Voice	EE	KGC676	Hagerstown, MD	FD. Voice ID at 00 and 30 min. past hour.
33.900	NBFM	Voice	EE	KQA216	Cleveland, OH	Cleveland FD. Voice ID at start of hour.
34.110	NBFM	Voice	ss	Blanco, Central, L5, Mantenimento, Mobil Mexico Blanco, 5, 7, 18, 20, 31, 32, 47, 59, 77, 89, Planta 3	Yucatan Penninsula,	
34.250	NBFM	Voice	EE		U.S.	Military
34-310	NBFM	Voice	EE	Video Channel 1	White Sands Missile Range, NM	Traffic related to weapons testing.
34.480	NBFM	Voice	pp		Sao Palo, Brazil	Taxi or bus company
34.830	NBFM	Voice	EE		U.S.	U.S. Fish and Wildlife Service. This frequency used for repeater outputs and simplex. Base stations often ID location.
35.100	NBFM	Voice	EE	KBO417	Los Angeles County, CA	Bel Air Patrol. Voice ID at start of hour.
35.200	NBFM	CW		KNKC911	Southern CA	San Diego Paging, Inc. Several paging stations with same callsign.
35.260	NBFM	CW		KOS225	PR	North Communications of Puerto Rico. Several paging stations with same callsign.
35.280	NBFM	Votce			Argentina	Several paging stations
35.340	NBFM	CW		KNKK371, Johnstown, PA; KNKK398, New Scotland, NY; KNKK403, Canton, OH; KNKK408, Evansville, IN; KNKK423, Youngstown, OH; KNKK439, Huntington, WV; KNKK447, Binghamton, NY; KNKK456, Davenport, IA; KNKK565, Little Rock, AR; KNKK580, Daytona Beach, FL; KNKK581 Cedarville, OH; KNKK582, New Berlin, WI; KNKL261, Mishawaka, IN; KNKL300, Richmond, VA;		U.S. Central, Inc. Paging Stations.
35.340	NBFM	CW		KOR995,	CA	Mobilecomm of California,Inc. Several paging stations with same callsign.
35.360	NBFM	Voice	ss		Rosario, Argentina	Studio-to-transmitter link for 95-76 MHz FM
35.540	NBFM	CW		KOR793	OR and WA	Clifford and Barbara Moeller. Several paging stations with same callsign.
35.550	AM	Voice	pp		Brazil	Paging station
35.600	NBFM	CW		KNKG760	AZ	Phoenix/Tucson Paging Corp. Several paging stations with same callsign.
35.625	AM	Voice	pp		Brazil	Paging station
35.640	NBFM	CW	--	KTS543	Chicago, IL	Cook County General Hospital. Paging station.
35.650	AM	Voice	pp		Brazil	Paging station
35.680	NBFM	CW		WNIZ885	Los Angeles, CA	California Hospital Medical Center. Paging station.
35.680	NBFM	CW		WNGJ364	New Rochelle, NY	New Rochelle Hospital. Paging station.
35.725	AM	Voice	pp		Brazil	Paging station
35.880	NBFM	Voice	pp		Thousand Oaks, CA	Thousand Oaks Cab Co.
35.460	NBFM	CW		KOP303	Langley, WA	Whidbey Telephone Co. Paging station.
35.500	NBFM	CW		KPD783	ID and WA	Big Country Communications. Several paging stations with same callsign.
36.695	AM	Voice	ss		Colombia	Studio-to-transmitter link for a station of Cadena Super de Colombia.
36.700	NBFM	Voice	ss	Gavillan	Southern Mexico	Army stations.

Abbreviations:
CW Identifies in Morse Code
EE English
FCC Federal Communications Commission
FD Fire Department
GG German
ID Identification
NBFM Narrow Band FM
pp Portuguese
ss Spanish

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An Outdoor Sloping Dipole

Improved reception of low band skip can be had with an outdoor sloping dipole cut for the VHF low band (Figure 1). This type of antenna is cheap, easy to build, does a decent job of picking up signals from 3-1,000 MHz, and it only needs a single support.

If you decide to build a sloping dipole, the first step is to go outside and decide where to erect the antenna. Look for a tree limb or other support that's at least 21 feet high (6.40 m). Make sure that the antenna will be far enough from any power lines to prevent accidental contact. Then estimate the distance from the antenna jack on your scanner to the center of the dipole. Take the estimate and then add 10 feet (3.04 m) to it. The resulting sum is the length of coax you'll need.

Buy high quality coax. I prefer Remeeflex miniature RG-8/U because of its low loss and small diameter. Using less expensive coax probably won't affect VHF low band reception, but it will reduce performance at higher frequencies, especially above 400 MHz.

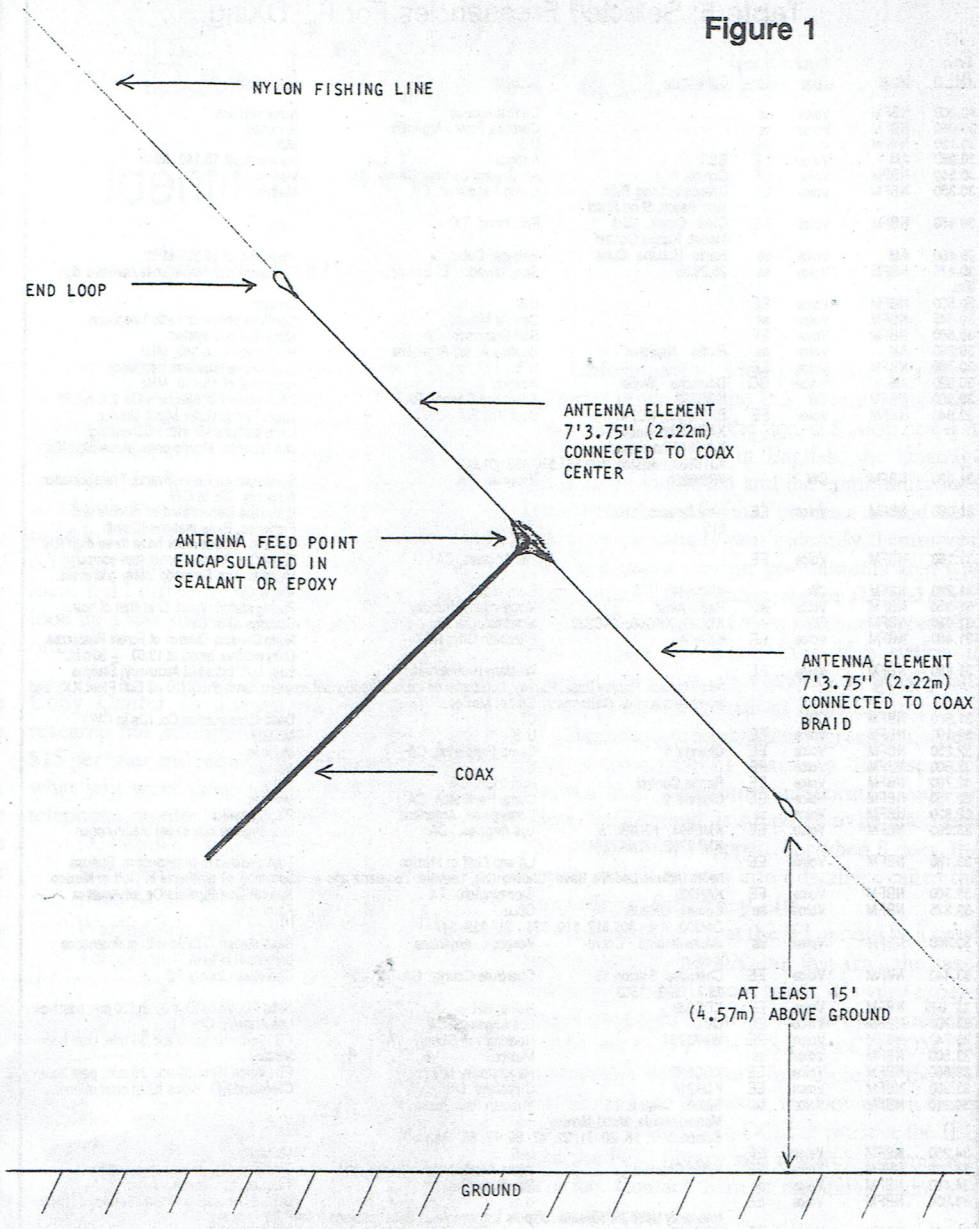
The antenna elements can be fabricated from any copper wire between 18 and 22 gauge. The wire can be solid or stranded, insulated or bare. Stranded is more flexible and easier to work with. If your receive site is near the ocean, you may want to use insulated wire because it resists corrosion better.

To make the dipole elements, cut two lengths of wire that are each 7 feet 5.25 inches (2.32 m) long. Take 1 inch (2.6 cm) of wire at the end of each element and twist the wire together to form a loop. Then use a soldering iron to heat the wire and run solder into the twists.

Then strip off two inches of the plastic jacket from the end of the coax. Unravel the braid. Strip 1 inch (2.6 cm) of insulation from the center conductor. Solder one wire element to the center conductor and one to the braid.

Coax easily absorbs moisture and the feed point of the dipole is fragile. This makes it necessary to encapsulate the feed point to waterproof and strengthen it. I prefer a sealant called Plumbers Goop; it's very tough and adheres well to most materials. Epoxy resin is also a good choice. Although many people use RTV Silicone Sealant, I try to avoid it because it contains acetic acid which will corrode the wire and solder joints. However, you can still use it if you first wrap the feed point in electrical tape before applying the RTV.

Figure 1



If you wear soft contact lenses, remove them or put on goggles before working with the RTV. The acid fumes from RTV are easily absorbed into the lenses and can ruin them. Whichever sealant you use, be sure to apply enough to waterproof the feed point and prevent the wires from flexing.

We're now ready to erect the antenna. Take a roll of heavy duty nylon fishing line and attach it to the antenna support. If you plan to use a tree limb, find a way to get the line over the limb and down the other side. If you're going to use a building for a support, try to screw an eyebolt into the side and then pass the nylon line through the hole and let it drop all the way to the ground. Then tie the line to the loop of the antenna element that's connected to the center conductor of the coax.

Pull on the far end of the line until the antenna is as high as you can get it. Then tie down the end of the line and cut it. Tie the line to the loop of the grounded antenna element and then tie it to a stake in the ground or other suitable end point.

Next, route the coax into your house to your radio. Put an RF connector on the end of the cable and plug it into your scanner. Tie down the coax near your radio and push the remainder of the cable outside of the building. In theory, the coax should run from the antenna feed point at a right angle for at least 7 ft. 3-3/4 in. (2.22m). Once this has been done, your antenna should be complete.

Morse Code Identifications

Some stations identify themselves using medium and high speed Morse code. Unless you're proficient at copying CW, you'll probably have to slow down recordings of station IDs so that you can make out the characters. If you plan to use a data demodulator to decode CW station IDs, you'll need to vary the audio frequency of your recordings so that they fall within the unit's audio pass band.

You can change the speed and audio frequency of recordings by using a variable speed controller. This device plugs into your cassette unit's remote jack and works by varying the voltage to the motor in the tape drive.

You can make one by soldering a 100 ohm pot to a subminiature audio plug. If the audio is too high, adjust the pot to the point where you can decipher the characters by ear, or until your digital demodulator can read the Morse code.

If the audio frequency is too low, try playing the recording of the ID in one cassette at normal speed and feed the audio into a second cassette recorder operating at reduced speed. Then play the audio from the second audio recorder into the digital signal decoder and vary the audio frequency by adjusting the pot.

Another approach is to have the speed controller plugged into your recorder's remote jack to reduce the recording speed whenever you're DXing for CW IDs. This will result in recordings with a higher audio frequency when played back at normal speed.

ality of the voices based on the accent. Have your translator listen for references to place names. Once he/she is finished, get a detailed description of the subject matter discussed on the tape.

A good place to find information that can help you identify your DX catches is a public or college library. Probably the most valuable source of information is a book called The *Columbia Lippincott Gazetteer of the World.* To my knowledge, this book is the most complete directory of place names available.

Another source of information found in many libraries are detailed road maps of the US, Canada, and foreign countries. An often overlooked resource are telephone directories for other areas. Check and see which directories your library has in its inventory.

Summary

My main objective in this article was to present information on how to target low band skip and how to complete your logging entry by making an identification. If you decide to try DXing the 30-50 MHz band, I'd be interested in what you hear. Of course comments and questions regarding this article are also welcome. I can be contacted at the following address:

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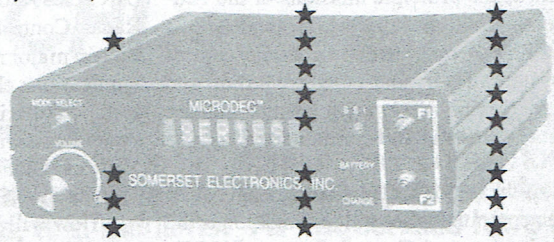

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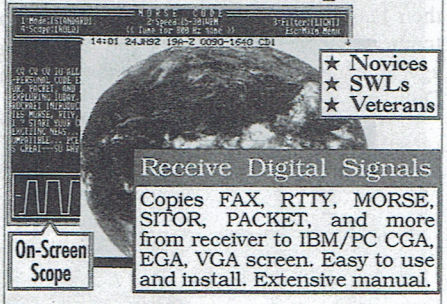
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